UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
TYLER DIVISION

BLUE SPIKE, LLC, *Plaintiff*, v. TEXAS INSTRUMENTS, INC. *Defendants*.	§	Civil Action No. 6:12-CV-499-MHS-CMC (LEAD CASE) JURY TRIAL DEMANDED
BLUE SPIKE, LLC, *Plaintiff*, v. AUDIBLE MAGIC CORPORATION, ET AL. *Defendants*.	§	Civil Action No. 6:12-CV-576-MHS-CMC (CONSOLIDATED WITH 6:12-CV-499) JURY TRIAL DEMANDED

EXPERT DECLARATION OF DR. MATTHEW TURK

I, Matthew A. Turk, declare as follows:

1. I have personal knowledge of the facts set forth herein. If called upon to testify on the matters stated herein, I could and would testify competently thereto.

2. I have been asked by Defendant Facebook, Inc. to provide opinions regarding the definiteness of certain claim terms of U.S. Patent Nos. 7,346,472 ("the '472 patent"), 7,660,700 ("the '700 patent"), 7,949,494 ("the '494 patent"), and 8,214,175 ("the '175 patent"), the patents-in-suit.

3. In this declaration, I provide my qualifications and background, my opinions that certain terms in the patents-in-suit are indefinite, and the bases for those opinions. As set forth

further below, I provide the following opinions:

(1) "abstract" is indefinite because the specification fails to inform one of ordinary skill in the art what an abstract is, or how to create an abstract;

(2) "similar to" is indefinite because the patents-in-suit do not identify the similarity measures used or provide information about what inputs make an abstract "similar to" its reference signal;

(3) "index of relatedness" is indefinite because the patent's specification fails to inform one of ordinary skill what is meant by "index of relatedness" or of how "related" two abstracts need to be;

(4) "programmed or structured to use an algorithm to generate said digital reference/query signal abstract from said digital reference/query signal" is indefinite because the specification does not disclose an algorithm that can be used to generate an abstract, much less address the various algorithms that apply across the different technologies that Blue Spike contends are covered by the patents-in-suit; and

(5) "data describing a portion of the characteristics of its associated reference signal" is indefinite because the specification provides no guidance on which portion, or what characteristics, the term refers to.

4. It is my understanding that I may be asked by Facebook to render additional opinions on the invalidity and/or non-infringement of the Asserted Patents, among other topics. I understand that discovery is continuing in this case and I may be asked to render different opinions based on additional information that may be made available in the future. As a result, I reserve the right to amend or supplement my opinions in light of evidence presented by Plaintiff Blue Spike, LLC, in light of additional information, and in light of the fact that discovery is continuing and that expert disclosures have yet to occur.

QUALIFICATIONS

5. I am a professor in the Computer Science Department at the University of California, Santa Barbara, and have worked and studied in the field of computer vision,

including facial-recognition technology, since 1984. My complete curriculum vitae is attached as Exhibit A, although I discuss some of the relevant highlights below.

6. I received my doctorate degree in Media Arts and Sciences from the Massachusetts Institute of Technology in 1991. My doctoral work concerned automatic face recognition. I received my Master of Science degree in electrical and computer engineering from Carnegie Mellon University in 1984. My Master's work was in the area of robot fine motion planning. I received my Bachelor of Science degree in electrical engineering from Virginia Tech (VPI & SU) in Blacksburg, Virginia in 1982.

7. In 1991, I published the paper "Eigenfaces for Recognition," which I co-authored with Dr. Alex Pentland. The paper helped lead to practical automated facial-recognition systems used in today's security and surveillance as well as in consumer applications. My work on Eigenfaces has received many awards, including an IEEE Computer Society Outstanding Paper award at the IEEE Conference on Computer Vision and Pattern Recognition in 1991 and a "Most Influential Paper of the Decade" award from the International Association for Pattern Recognition (IAPR) Workshop on Machine Vision Applications (MVA-2000). According to Google Scholar, "Eigenfaces for Recognition" has been cited over 12,000 times. Further, not only did the Eigenfaces approach capture much of the initial attention regarding automated facial recognition, but it continues to be taught and used as a benchmark for facial-recognition systems more than twenty years later.

8. From 1994 to 2000, I was a researcher for Microsoft Research, where I was a founding member of the Vision Technology Research Group and conducted research in vision-based human computer interaction and perceptual user interfaces.

9. In 2000, I joined the faculty of the University of California, Santa Barbara, as an associate professor. In 2005, I was promoted to full professor and served as the Chair of the Media Arts and Technology Graduate Program from 2005 to 2010. At UCSB, I have taught graduate and undergraduate classes related to computer vision, computer imaging, human computer interaction, probabilistic models and methods, artificial intelligence, computer graphics, machine learning, and other areas.

10. I co-founded (in 2003) and co-direct the Four Eyes Lab at UCSB, where our research focus is on the "four I's" of Imaging, Interaction, and Innovative Interfaces. The Four Eyes Lab researches a variety of topics, including computer vision, pattern recognition, and facial-recognition technologies.

11. As a result of my work and research, I am a named inventor of U.S. Patent Number 5,164,992 entitled "Face Recognition System" and U.S. Patent Number 6,674,877 entitled "System and Method for Visually Tracking Occluded Objects in Real Time."

12. I am a founding member of the Advisory Board for the International Conference on Multimodal Interfaces, which provides a venue for disseminating recent advances in multimodal interaction research, systems, and methods. I served as the Chair of the ICMI Advisory Board from 2006 to 2009. I am also a founding member of the Advisory Board for the IEEE International Conference on Automatic Face and Gesture Recognition and served as the General Chair for the conference in 2011. Recently, I served as General Chair for the 2014 IEEE Conference on Computer Vision and Pattern Recognition, the primary annual conference in the field of computer vision, with over 2000 attendees.

13. I am an Associate Editor of the ACM Transactions on Intelligent and Interactive Systems, the Journal of Image and Vision Computing, and the International Journal of Computer

Vision and Signal Processing. I have also served as a guest editor of several other journals related to computer vision, machine learning, and facial recognition.

14. In 2013, I was elected as a Fellow of the IEEE (the Institute of Electrical and Electronics Engineers) for my contributions to computer vision and perceptual interfaces, an award conferred by the Board of Directors of the IEEE upon a person with an extraordinary record of accomplishments in any of the IEEE fields of interest. The total number of IEEE fellows selected in any one year does not exceed one-tenth of one percent of the total voting Institute membership. In 2014, I was elected as a Fellow of the International Association for Pattern Recognition (IAPR) for my contributions to computer vision and vision-based interaction. I am also the recipient of the 2011-2012 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies.

MATERIALS CONSIDERED

15. A complete list of the materials I considered in forming my opinions set forth in this declaration is attached as Exhibit B, and includes U.S. Patent Nos. 7,346,472, 7,660,700, 7,949,494, and 8,214,175, their file histories, Blue Spike's Patent Local Rule 3-1 Infringement Contentions, the parties' Patent Local Rule 4-3 Supplemental Joint Claim Construction and Prehearing Statement and Joint Claim Construction Chart, and Blue Spike's Opening Claim Construction Brief.

LEGAL STANDARDS

16. I have been informed about certain legal standards applicable to the statutory requirements for a patent claim. It is my understanding that, to be valid, each claim of a patent must particularly point out and distinctly claim the subject matter which the inventor or a joint inventor regards as the invention. Indefiniteness, like claim construction, is a question of law to

be decided by the Court. But it is based on underlying factual findings, such as the knowledge and understanding of a person of ordinary skill in the art.

17. I understand that the statutory requirement of "definiteness" is met only when claims clearly distinguish what is claimed from what went before in the art and clearly circumscribe what is foreclosed from future enterprise. Thus, I understand that a claim is indefinite if its limitations, read in light of the patent's specification and prosecution history, fail to inform, with reasonable certainty, one skilled in the art about the scope of the invention. I understand that this standard was articulated by the Supreme Court in *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120 (2014). Finally, I understand that an issued patent is entitled to a presumption of validity and that indefiniteness must be shown by clear and convincing evidence.

18. It is also my understanding that a patent claim is presumed to be valid as a matter of law. I understand that proof that a patent claim is invalid must be supported by clear and convincing evidence. I understand clear and convincing evidence to require a high burden of persuasion. I must have a strong conviction in the facts to support my conclusions. In this declaration, I analyze the asserted claims of the patents-in-suit in light of this clear and convincing standard.

19. In addition, I understand that the scope of claim language cannot depend solely on the unrestrained, subjective opinion of a particular individual purportedly practicing the invention. A patent must provide some objective standard in order to allow the public to determine the scope of the claimed invention.

20. I have also been informed about the standards relating to the construction of the terms of a claim. I understand that the construction of a term is a question of law to be decided by the Court.

21. I understand that the starting point for any claim construction must be the claims themselves. In addition, absent a disclaimer or an instance in which the patentee has acted as a lexicographer, I understand that claim language is generally given the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.

22. In addition to the language of the claims, I understand that the specification of the patent is highly relevant to claim construction and is often the single best guide to the meaning of a disputed term. Indeed, I understand that the language of the specification can narrow the meaning of a claim term. For example, I understand that when the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question.

LEVEL OF ORDINARY SKILL IN THE ART

23. I am informed that certain factors may be considered in determining the level of ordinary skill in the art at the time of the invention: (1) the type of problems encountered in the art; (2) prior art solutions to these problems; (3) the rapidity with which inventions are made; (4) the sophistication of the technology; and (5) the educational level of active workers in the field. I am also informed that a person of ordinary skill in the art is also a person of ordinary creativity, not an automaton.

24. Based on my knowledge and experience, it is my opinion that a person of ordinary skill in the art relevant to the patents-in-suit at the time of their purported invention (*i.e.*,

at least by September 7, 2000, which I understand Blue Spike claims is the priority date of the patents-in-suit) would have been a person with at least a bachelor's degree in electrical engineering, computer science, or equivalent degree, with a background and at least two years' experience in signal processing, image processing, biometric identification, or a related field.

25. At least by 2000, I would have qualified as a person of ordinary skill in the art. By 1982, I had received my Bachelor of Science degree in electrical engineering from Virginia Tech (VPI & SU) in Blacksburg, Virginia. By 1991, nine years before the purported invention of the patents-in-suit, I had received my doctorate degree from the Massachusetts Institute of Technology. My doctoral work concerned automatic face recognition. Also by 1993, seven years before the alleged invention of the patents-in-suit, I had published multiple articles regarding digital image processing and pattern recognition, including "Face Processing: Models for Recognition," "Recognition in Face Space," "Face Recognition without Features," "Eigenfaces for Recognition," "Face Recognition using Eigenfaces," and "Experiments with Eigenfaces."

THE PATENTS-IN-SUIT

26. I understand that the four patents-in-suit relate to signal processing technology. I understand that the patents generally describe a system and method for monitoring and analyzing signals. I understand that Blue Spike alleges that the patents-in-suit cover Facebook's facial recognition technology as well as other technology Facebook licenses from Audible Magic. In reviewing the patents-in-suit, I found no disclosure or teaching focused upon facial recognition or, for that matter, any type of biometric analysis. The patents' failure to specifically address technologies that are specific to facial recognition compounds the indefiniteness of the asserted claims when they are viewed in light of Blue Spike's assertion that the claims are broad enough

to cover Facebook's facial recognition technology, notwithstanding the fact that the patents never mention the word "face" or teach any signal processing techniques that are specific to the difficult technical challenges presented by computer facial recognition. For purposes of this declaration, I have developed opinions in light of Blue Spike's infringement contentions solely to reflect the scope of Blue Spike's patent claims as they have been asserted.

27. I also understand that the four patents-in-suit are part of the same patent family and share a common specification.

28. As described in the Abstract of the patents-in-suit, the claimed invention is a "method and system for monitoring and analyzing at least one signal." '472, '700, '494, and '175 patents at Abstract. The Abstract describes the invention in this way: "An abstract of at least one reference signal is generated and stored in a reference database. An abstract of a query signal to be analyzed is then generated so that the abstract of the query signal can be compared to the abstracts stored in the reference database for a match." *Id.*

29. I understand that Blue Spike has asserted the following claims of the patents-in-suit in a series of related cases: claims 3, 4, 8, 11, and 12 of the '472 patent; claims 1, 6, 7, 8, 10, 11, 40, 49, 50, and 51 of the '700 patent; claims 1, 4, 5, 11, 17, 18, 20, 21, and 22 of the '494 patent; and claims 8, 11, 12, 13, 15, 16, and 17 of the '175 patent. I also understand that not all claims are asserted against all defendants. Claims 12 of the '472 patent and 8 of the '175 patent are not asserted against Facebook.

30. Facebook's accused technology in this lawsuit is its facial recognition and tag suggestion technology, which recognizes faces in uploaded photos and suggests names of people with which to tag those faces. I understand that Facebook is also accused of infringing the patents-in-suit through its use of technology that recognizes copyrighted works, which Facebook

licenses from Audible Magic. I have only been asked to give an opinion on the patents' applicability to facial recognition technology.

31. I understand that the other defendants in this lawsuit create products with different technologies, such as music recognition, other audio and video recognition, text recognition, and fingerprint and other biometric identification.

CLAIM TERMS

"abstract"

32. The term "abstract" appears in every asserted claim of the patents-in-suit. Claim 3 of the '472 patent presents one example of how the term is used:

> A method for monitoring and analyzing at least one signal comprising:
>
> [a] receiving at least one reference signal to be monitored;
>
> [b] creating an **abstract** of said at least one reference signal;
>
> [c] storing the **abstract** of said at least one reference signal in a reference database;
>
> [d] receiving at least one query signal to be analyzed;
>
> [e] creating an **abstract** of said at least one query signal;
>
> [f] comparing the **abstract** of said at least one query signal to the **abstract** of said at least one reference signal to determine if the **abstract** of said at least one query signal matches the **abstract** of said at least one reference signal;
>
> [g] creating at least one counter corresponding to one of said at least one reference signals, said at least one counter being representative of the number of times a match is found between the **abstract** of said at least one query signal and the **abstract** of said at least one reference signal; and
>
> [h] incrementing the counter corresponding to a particular reference signal when a match is found between an **abstract** of said at least one query signal and the **abstract** of the particular reference signal

33. "Abstract" does not have a precise technical definition in the field of signal processing. I have been active in this field for more than 30 years, and I do not recall ever encountering "abstract" used the way the patents-in-suit appear to use it. Were I to use the term

with colleagues, I would need to define how I was using it to make sure they understood what I meant.

The specification and file histories do not provide a definition of "abstract"

34. I have read the specification and file histories of the patents-in-suit. They do not provide the context necessary for me to clearly determine what the patents mean by "abstract." I can make an educated guess that an "abstract" would be what one of ordinary skill would likely refer to as a "representation" but I am uncertain that the term "abstract" has that or any other meaning. In reviewing this term, I have assumed that the patents use "abstract" in the way I would use "representation.[1]" Even making that assumption, I would need detailed information about what techniques to use before I could understand the scope of the claims in the asserted patents. The generic word "representation" encompasses many different techniques, some of which are incompatible. "Abstract" is so broad as to be meaningless, because, if it generically refers to a "representation" of a digital signal, it vaguely refers to the collective knowledge in my entire field of study about how to capture something relevant from a digital signal that enables value-added analysis to be performed.

35. The specification of the patents-in-suit does not inform a person of ordinary skill about what an "abstract" is in the context of these patents. The specification and file history provide only vague statements about the "perceptual relationship" between an abstract and the original signal. To give some examples:

[1] Ex. C, Jens Rasmussen, *Skills Rules, and Knowledge; Signals, Signs, and Symbols, and Other Distinctions in Human Performance Models*, 3 IEEE Transactions on Systems, Man, and Cybernetics 257–266 (1983), *available at* http://www.carlosrighi.com.br/177/Ergonomia/Skills%20rules%20and%20knowledge%20-%20Rasmussen%20seg.pdf

> "…a more logical and self-sufficient relationship between the original and its data reduced ***abstract*** enhances the transparency of any resulting monitoring efforts…." *Id.* at 5:67-6:3.
>
> "The present invention concerns itself with perceptible relationships only to the extent that efficiencies can be achieved both in accuracy and speed with enabling logical relationships between an original signal and its ***abstract***." '472 patent at 9:42-46.
>
> "[s]ignal ***abstracts*** retain a perceptual relationship with the signal from which it was created or derived." June 5, 2009 Amendment & Request for Reconsideration after Non-Final Rejection at 19 (emphasis added in each).

The preceding statements provide no information about how an "abstract" ultimately relates to its original signal. The patents seem to assert that a point of novelty of the claimed inventions is that an abstract retains a logical or perceptual relationship with the signal from which it was created or derived, but there is no teaching about how to achieve this result, and thus, these portions of the specification do not inform one of ordinary skill of the art of the essential characteristics of an abstract in a manner that is tangible or understandable.

36. The confusion created by the disclosure is compounded because the specification also states that two or more people must agree on what the relationship is and whether a particular "abstract" has a close enough relationship to its signal: "*In some cases*, data reduction alone will not suffice: the ***sender and receiver must agree*** to the accuracy of the recognition. *In other cases*, agreement will actually depend on a third party who authored or created the signal in question." '472 patent at 9:51-54 (emphasis added). The acknowledgement that, in some embodiments, two or more people must subjectively determine whether an abstract has a sufficient perceptual relationship with its signal provides another basis for finding the term indefinite. The requirement that an "abstract" have a perceptual relationship to the original signal leaves its meaning indefinite because the determination whether a perceptual relationship exists is dependent on the unrestrained, subjective opinion of one or more particular individuals.

The specification does not adequately explain how to create an "abstract"

37. Nor does the common specification provide enough information for one of ordinary skill to create an "abstract." It gives these steps for creating an "abstract:" "the abstract of a signal may be generated by the following steps: 1) analyze the characteristics of each signal in a group of audible/perceptible variations for the same signal (e.g., analyze each of five versions of the same song—which versions may have the same lyrics and music but which are sung by different artists); and 2) select those characteristics which achieve remain [sic] relatively constant (or in other words, which have minimum variation) for each of the signals in the group." *See, e.g.*, '472 patent at col. 3:67-4:7.

38. These steps would not inform one of ordinary skill how to create an abstract. The first step to analyze the characteristics of each signal is not adequately specified, because there are numerous ways to analyze a signal, all depending on the intended use of the analysis; research in the fields of signal processing and pattern recognition largely deals with these many methods and related issues. Within the field of facial recognition alone, "analyze the characteristics" could refer to measuring the distribution of values (e.g., intensities or colors in an image, as in computing a color histogram), frequency components of a signal (e.g., in Fourier analysis), spatial or temporal variations (e.g., texture measures), or many other techniques. One skilled in the art would have to know the intended use of the analysis in order to determine what kind of analysis to attempt.

The specification does not teach how
to create an abstract from a single version of a reference signal

39. As I discuss above, the specification describes a two-step process for creating an abstract: First, analyze "the characteristics of each signal in a group of audible/perceptible

variations for the same signal." Next, select the characteristics that remain relatively constant for each signal in the group.

40. The specification also does not teach how to create an abstract using a single version of a reference signal; rather, it mentions creating an abstract from a group of signals. The asserted claims contemplate creating an abstract from a single version of a signal—*i.e.* a single image of a person's face. *See* '472 patent claim 3 ("creating an abstract of said at least one reference signal . . . creating an abstract of said at least one query signal"). But the specification does not include any teaching about how a person of ordinary skill would do so; the only disclosure in the patents-in-suit concerning creation of abstracts discusses the creation of an abstract based on the similarities in multiple versions of a signal. Even if that teaching were meaningful (and it is not for the reasons discussed here) it fails to explain how an abstract can be created from a single version of a signal, so the scope of this embodiment of abstract is impossible to determine.

41. The next step of selecting the characteristics that remain relatively constant is also not adequately specified because there is no guidance about how to use the analysis from step 1 to do this. In addition, determining what constitutes "relatively constant" or "minimum variation" is very difficult to achieve in practice on real-world data, which tends to have a significant amount of variation (or "noise") that is unrelated to the characteristics of interest.

42. For example, in face recognition applications, analyzing a set of face images and selecting useful characteristics to be used in subsequent recognition is still an active area of research, with many methods having been proposed over the years, including template matching, Eigenfaces, Fisherfaces, deformable templates, Gabor filter-based graph matching, local binary patterns, and a host of others. Some methods are best suited for particular imaging conditions,

database sizes, or computational constraints. Others handle certain variations—such as occlusions, changes in facial expression, or variations in head pose—better than others. In all cases, the choices of the analysis method and the method of selecting invariant features (i.e., characteristics that remain relatively constant) are anything but straightforward, and in many circumstances, a subjective judgment is required to select an analytical approach that is likely to be most effective. As a result, generically referring to "select[ing] those characteristics which achieve remain [sic] relatively constant (or in other words, which have minimum variation)" fails to provide any objective limitation on how to select the characteristics, and hence, no guidance regarding what an abstract is or how one is created.

43. For example, in the Eigenfaces technique for representing and recognizing face images, face images are analyzed using a statistical method called Principle Components Analysis (PCA). Once analyzed in this way, it is still a challenge to determine how many characteristics (Eigenfaces) to use in order to represent a face image well enough to distinguish it from other faces and, additionally, how to determine the boundary defining the "minimum variation" representation of that individual's face images. Other methods may use measures like Linear Discriminant Analysis (LDA) to determine how to best represent a group of similar signals compared to other (non-similar) signals. These choices are not straightforward.

The specification does not describe a complete process of creating an abstract

44. Finally, the specification's two-step process does not explain what the next steps to create an "abstract" are after analyzing the signal and choosing the characteristics that remain relatively constant. To create an "abstract," I would require an explanation of the data reduction or other process to use to create the abstract. The specification states only that "Lossless and lossy compression schemes are appropriate candidates for data reduction technologies, as are

those subset of approaches that are based on perceptual models" '472 patent at col. 4:8-10. This vague statement does not inform me what technique to use to create an "abstract" from the original signal. There are many ways to create a compressed representation of a signal (as taught in the fields of information theory and signal compression), but these are very dependent on the type of signal and the specific goals of the compression (e.g., to maximize compactness, to minimize errors in storage or transmission, to minimize perceptual artifacts, etc.).

45. The specification also lists several data reduction techniques as "appropriate tools to measure signal characteristics": "Linear predictive coding (LPC), z-transform analysis, root mean square (rms), signal to peak." '472 patent at col. 4:18-32. None of these techniques are typically used in facial recognition.

46. The patentee did not serve as his own lexicographer by expressly defining "abstract" in the specification of the patents. I understand that to define a word in the intrinsic record, the patentee must clearly and deliberately spell out that the word means what the patentee says it does. I found no clear statement in the patents' specification that defined "abstract."

47. To avoid indefiniteness, the patents-in-suit would need to provide at least one complete example of how to create an "abstract," or one concrete example of an abstract and its original reference or query signal. They do not. In addition, the patents-in-suit use "signal" to refer to many kinds of digital information, including images, audio, and video. Yet they provide no details about how to analyze these different kinds of data to create an "abstract." In my experience, a method to create a useful representation for one type of signal (e.g., a face image) is completely different from that for a different type of signal (e.g., a fingerprint image, or an audio signal).

48. The term "abstract" in the patents-in-suit is indefinite because the specification and file histories do not provide a definition; because the specification does not give enough information for one of ordinary skill to know how to create an abstract; because the specification discloses creating an abstract from more than one version of a signal yet the claims disclose creating an abstract from at least one version of a signal; and because the specification does not provide a complete example of how to create an abstract. The claims' limitations, read in light of the patent's specification and prosecution history, fail to inform, with reasonable certainty, one skilled in the art about the scope of the invention.

"similar to"

49. The term "similar to" appears in claims 8, 11, and 17 of the '175 patent. All three claims use the term in the same limitation: "A system, comprising: . . . at least one processor; wherein said at least one processor is programmed or structured to generate a digital reference signal abstract from a digital reference signal such that said digital reference signal abstract is **similar to** said digital reference signal and reduced in size compared to said digital reference signal." *See, e.g.,*'175 patent claim 11, *see also id*. claims 8, 17.

50. The patents-in-suit's specification does not use the term "similar to" in the context of what makes a digital signal abstract similar to a reference signal. Its only use of the term is in the sense that "similar" means "like" in ordinary English. *See* '175 patent at col. 14:39–44 ("Similar to the goals of a psychoacoustic model, a psychovisual model attempts to represent a visual image . . ."). The specification provides no guidance on how a digital signal abstract is similar to a digital reference signal.

51. "Similar" is not a precisely defined technical term. I understand "similar" when used in "similarity metric," which is a distance measure intended to measure similarity or dissimilarity between two objects (or, more specifically, between their representations). A large number of image similarity metrics have been proposed in imaging and pattern recognition problems – e.g., Pearson correlation coefficient, Hamming distance, Mahalonobis distance, Tanimoto measure, Spearman's Rho, Hellinger distance, Bray-Curtis distance, etc.[2] To determine which similarity metric to use for a given problem, one of ordinary skill in the art would need a clear understanding of what is considered similar or dissimilar for the problem. For example, the context of an imaging problem may require that similarity is primarily a function of color, size, location, or any number of other aspects, or combinations of multiple aspects, of the images. To apply a similarity metric, one of ordinary skill would need a specification of the representation used and the specific similarity metric chosen. The '175 patent discloses neither of these.

52. When one of ordinary skill describes the application of a "similarity metric," it is always accompanied by a disclosure of what characteristics of the signals of interest are to be considered, as well as the level of similarity required for the application. For example, in the context of automatic face recognition, one may define a similarity metric between faces (e.g., faces A and B) that produces a high measure of similarity when the two-dimensional geometry of the main face features (locations and perhaps shapes of eyes, eyebrows, the nose, the lips, etc.) are similar. Alternatively, a similarity metric may focus on the face color and texture, so that, for example, two images of the same person but with very different facial expressions may still have

[2] *See* Ex. D, Morton Nadler and Eric P. Smith, Pattern Recognition Engineering 289-294 (John Wiley & Sons 1993.)

a high similarity measure. In both cases, the means of determining the level of similarity from the numerical similarity metric is not straightforward, as it depends on the characteristics chosen, the specific metric used, and the distribution of these measures across the population of interest.

53. The ’175 patent does not appear to use “similar to” in the sense of “similarity metric” because it does not provide the needed information to be a similarity metric. It explains nothing about how alike the reference signal needs to be to its abstract. There is no explanation or context for what “similar” means. Without an objective standard for determining what is meant by the term “similar to,” the degree of likeness is entirely dependent on the subjective opinion of the person practicing the invention. In my opinion, one of ordinary skill would have no sense of how to interpret “similar” or what degree of likeness the query and reference signals would need to have based on the context of the patents-in-suit.

54. To avoid indefiniteness, the ’175 patent would need to identify the similarity metrics claimed and the inputs required to make a determination that a reference signal is similar to its “abstract.” Because the specification does not do so, the scope of claims 8, 11, and 17 of the ’175 patent is entirely subjective. The “similar to” limitations, read in light of the patent’s specification and prosecution history, fail to inform, with reasonable certainty, one skilled in the art about the scope of the invention. The term “similar to,” absent any guidance that informs one of ordinary skill how to understand the term, renders claims 8, 11, and 17 of the ’175 patent indefinite.

“index of relatedness”

55. The term “index of relatedness” appears only in claim 11 of the ’472 patent. Claim 11 claims:

> A computerized system for monitoring and analyzing at least one signal:
>
> . . . .
>
> a comparing device, coupled to said reference database and to said second input, that compares an abstract of said at least one query signal to the abstracts stored in the reference database to determine if the abstract of said at least one query signal matches any of the stored abstracts, Wherein the comparing device identifies at least two abstracts in the reference database that match the abstract of said at least one query signal and an **index of relatedness** to said at least one query signal for each of said at least two matching abstracts.

56. The term "index of relatedness" does not appear anywhere in the common specification of the patents-in-suit, or anywhere in the '472 patent other than within Claim 11 of the '472 patent. The specification thus provides no guidance on what "index of relatedness" means in the context of the '472 patent.

57. "Index of relatedness" has no precise technical meaning in the field of signal processing. One or ordinary skill in the art would not understand it absent explanation. I am a person of ordinary skill, and I find the term so vague as to be meaningless. I do not recall ever encountering the term "index of relatedness" in my 30-year career in computer vision and pattern recognition.

58. I understand the term to mean a gauge of some sort that is used to determine whether something is a match. To determine whether something is a match, I would need a measure of some kind for how "related" two signals needed to be to be considered a "match" in this invention. There are at least two ways I could understand "index of relatedness": as a ranking (representation X is a stronger match than representation Y) or as a value (i.e., on a scale between -1.0 and 1.0). The patents' specification does not indicate whether "index of

relatedness" refers to a ranking or a set of values. Furthermore, as I explain below, the patents fail to include additional information that would be critical for defining the scope of the term.

59. The specification of the patents-in-suit does not disclose how much "relatedness" it would take to determine if the two abstracts are "related." Claim 11 of the '472 patent calls for the selection of "at least" two matching abstracts to the reference signal abstract and the determination of an "index of relatedness." Yet it does not disclose how "related" the two matching abstracts need to be. The specification does not provide an objective standard for determining "relatedness." It is entirely dependent on the subjective opinion of a person supposedly practicing the patent.

60. To the extent that "index of relatedness" could be a table or other data structure, the specification does not disclose what that structure is. The patents-in-suit have no figures and contain no visual depiction of any table of other data structures. I found nothing in the patent specification that helped me determine how an "index of relatedness" works.

61. One of ordinary skill in the art would not be able to resolve the underlying ambiguity of "index of relatedness." There is no clear, objective standard for determining when two or more abstracts are related. Nor is there a clear, objective standard for determining how "related" two abstracts have to be to satisfy claim 11's requirement that the system determine "an index of relatedness . . . for each of said at least two matching abstracts." '472 patent claim 11.

62. Because the specification does not provide a clear, objective standard that would inform a person of ordinary skill of what an "index of relatedness" is, these limitations, read in light of the patent's specification and prosecution history, fail to inform, with reasonable

certainty, one skilled in the art about the scope of the invention. Claim 11 of the '472 patent is indefinite.

"Programmed or structured to use an algorithm to generate said digital reference/query signal abstract from said digital reference/query signal"

63. The term "programmed or structured to use an algorithm to generate said digital reference/query signal abstract from said digital reference/query signal" appears in claim 16 of the '175 patent. The claim reads: ". . . wherein said at least one processor is programmed or structured to use an algorithm to generate said digital reference signal abstract from said digital reference signal; and wherein said at least one processor is programmed or structured to use said algorithm to generate said digital query signal abstract from said digital query signal."

64. The patents-in-suit do not specify a particular technology, and never specifically discuss facial recognition. Instead, the patents speak only in generalities about monitoring digital information. The patents' description of the field of the invention provides a representative example: "Field of the Invention: The invention relates to the monitoring and analysis of digital information. A method and device are described which relate to signal recognition to enhance identification and monitoring activities." '175 patent at col. 2:3-6. I understand that this lawsuit is one of a number of lawsuits against unrelated companies with different technologies, including audio recognition, biometrics, and text recognition. In light of the extreme breadth of Blue Spike's infringement allegations, it is impossible to ascertain which, if any, of the multitude of algorithms in each of the areas of technology recited above is potentially covered by the reference to "algorithm" in claim 16 of the '175 patent.

65. The broad range of technologies Blue Spike asserts are covered by the patents-in-suit creates great uncertainty about which algorithm could be used to generate an "abstract" from

a signal. At least one algorithm could be used to generate a representation of an original signal for each different technology (face recognition, iris recognition, music recognition, etc.), as each technology requires different key aspects of the signals to be explicitly represented (face geometry, iris texture, dominant frequency components, etc.). Given the wide range of technologies alleged to infringe, "an algorithm," with nothing more, does not tell a person of ordinary skill what "programmed or structured to use an algorithm to generate said digital reference/query signal abstract from said digital reference/query signal" means.

66. Even if the patents-in-suit were limited to a particular technology (and if they were, it would not be facial recognition, which is not discussed), the specification does not identify an algorithm to be used to generate the reference or query signal abstract from the reference or query signal. Thus, the patent does not inform one of ordinary skill in the art with reasonable certainty what algorithm will create an abstract as described in the patent specification. In the field of facial recognition alone, for example, there are numerous algorithms (probably dozens if not hundreds) that one could apply to generate a useful representation of an image. But these are in no way interchangeable; a very deliberate choice would have to be made, informed by the specific goals and constraints inherent in the problem. Choosing such an algorithm, and developing new algorithms to represent faces, is still an active research area in the field.[3]

67. There is no disclosure of even a single algorithm in the specification of the '175 patent, much less any disclosure of the different algorithms that might be used for different kinds of signals, such as still images, video, or audio, and no disclosure whatsoever that specifically

[3] "While numerous hand-crafted and learning-based representations have been proposed, considerable room for improvement is still present." Ex. E, Chinchilla Doudou et al., *Learning Deep Face Representation*, arXiv:1403.2802 [cs.CV] (Mar. 12, 2014).

concerns facial recognition. The term "programmed or structured to use an algorithm to generate said digital reference/query signal abstract from said digital reference/query signal," read in light of the patent's specification and prosecution history, fails to inform, with reasonable certainty, one skilled in the art about the scope of the invention. Claim 16 of the '175 patent is thus indefinite.

"Data describing a portion of the characteristics of its associated reference signal"

68. The term "data describing a portion of the characteristics of its associated reference signal" appears in claims 7 of the '700 patent and 17 of the '494 patent. Dependent claim 7 '700 patent uses the term in this way: "wherein the stored abstracts **comprise data describing a portion of the characteristics of its associated reference signal.**" Claim 17 of the '494 patent similarly claims a system "wherein at least one abstract comprises **data describing a portion of the characteristics of its associated reference signal.**"

69. The specification does not provide any guidance on what "portion" refers to. It gives no examples of what constitutes a portion" in the context of characteristics of a reference signal. It uses "portion" only to discuss "the portion of a signal being monitored for analysis." *See* '494 patent at col. 8:34-36.

70. "Portion" does not have a precise technical meaning. The term "portion" is vague in two ways. First, it does not specify what amount "portion" means—the word could mean any part of a signal that is something less than the entire signal. Second, "portion" without more context does not specify *which* portion of the signal the term refers to. The patents' specification does not provide any guidance as to what is meant by "portion," regarding either the size or the content of the portion.

71. The second point is important because Claim 7 of the '700 patent depends from claim 1,[4] which presumably claims the creation of an abstract from more than just a "portion" of the characteristics of the reference signal. However, the creation of an abstract does not require that the abstract include all of the characteristics of a reference signal, just those that remain relatively constant. *See* ¶ 36, above. Any use of a "portion" requires knowing which characteristics are included in the abstract of claim 1.

72. Knowing ***what*** portion claim 7 refers to is important for understanding which portion to use in creating the abstract—and the specification does not inform the user how to determine which portion to use. A person of ordinary skill practicing the patents could not assume that any portion would do. Claim 7 must refer back to independent claim 1 and requires a portion of the characteristics used to create the abstract in claim 1.

73. Nor does the specification describe what "characteristics" are, and how one of ordinary skill could segment out a "portion" of those characteristics. "The signal identifier/ detector should receive its parameters from a database engine. The engine will identify those characteristics (for example, the differences) that can be used to distinguish one digital signal from all other digital signals that are stored in its collection." '494 patent at col. 10:20-24.

74. "Characteristics" does not have a precise technical meaning in the art. "Characteristics" could mean any feature of a reference signal. The specification of the patents provides no context as to what "characteristics" are meant by the term "a portion of the characteristics of its associated reference signal."

[4] Claim 17 of the '494 patent similarly depends from claim 11. The language is nearly identical and this argument applies to both the '494 and '700 patents.

75. A person of ordinary skill would not know what is meant by "data describing a portion of the characteristics of its associated reference signal."

76. The term "data describing a portion of the characteristics of its associated reference signal" does not inform one of ordinary skill about which portion to use, or what characteristics must be included in the portion. When read in light of the patent's specification and prosecution history, the term fails to inform, with reasonable certainty, one skilled in the art about the scope of the invention. Claims 7 of the '700 patent and 17 of the '494 patent are indefinite.

This I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed this 9th day of September, 2014, in Santa Barbara, California.

By:

Matthew A. Turk